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TRANSPORTABILITY TEST OF M467 AND M613 CONTAINERS ON HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV)

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PREPARED FOR:

U.S. Army Armament, Munitions and Chemical Command

ATTN: AMSMC-MAY-WA

Picatinny Arsenal, NJ 07806-5000

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The U.S. Army Defense Ammunition Center and School (USADACS) was requested by the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) to conduct a series of transportability tests to develop/evaluate tiedown procedures for the M467 container(s) and for the M613 container(s) on the M998 High Mobility Multipurpose Wheeled Vehicle (HMMWV). Using web strap tiedown assemblies, test loads with either one or two of the two type containers, successfully completed the USADACS five step road hazard course. An approved securement procedure was established for movement of the M467 and M613 containers on the HMMWV.

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REPORT NO. 25-89

TRANSPORTABILITY TEST OF M467 AND M613 CONTAINERS ON HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV)

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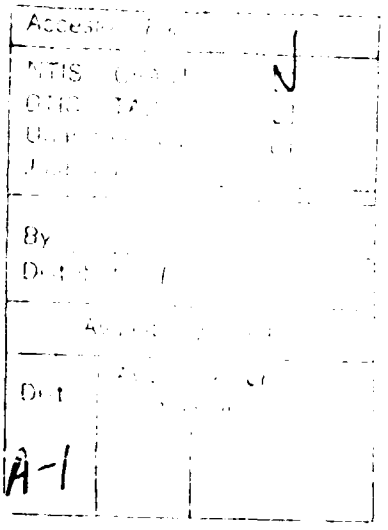

PART 1

GENERAL

A. INTRODUCTION

The U.S. Army Defense Ammunition Center and School (USADACS) was tasked by the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) to perform a series of transportability tests to develop/evaluate tiedown procedures for the M467 container(s) and for the M613 container(s) on the M998 High Mobility Multipurpose Wheeled Vehicle (HMMWV)

Using web strap tiedown assemblies hooked into either the original or the redesigned HMMWV cargo tiedown fittings, test loads of one or two of the two type containers successfully completed the USADACS five step road hazard course.

B. AUTHORITY

Testing was accomplished in accordance with mission responsibilities delegated by the U.S. Army Armament, Munitions and Chemical Command (AMCCOM). Reference is made to the following:

1. Change 4, 4 October 1974, to AR 740-1, 23 April 1973, Storage and Supply Activity Operations.

2. AMCCOM-R 10-17, 13 January 1986, Mission and Major Functions of USADACS.

3. Memorandum, AMCCOM, AMSMC-MAY-WA(D), 16 March 1989, subject: Request for Evaluation of Tiedown Procedures.

C. OBJECTIVE

The objective of this test was to develop/evaluate a procedure to restrain the M467 and M613 container(s) in the cargo area of the HMMWV.

D. CONCLUSIONS

1. All test loads evaluated performed satisfactorily.

2. The tiedown methods tested used both the original and redesigned HMMWV tiedown fittings. The low strap angle of approximately 20 degrees prevented both the original and redesigned HMMWV tiedown fitting from deforming.

E. RECOMMENDATIONS

1. Recommend the tiedown procedures as tested be adopted for movement of M467 and M613 containers in the HMMWV.

2. Recommend the M6B container tested tiedown procedures also be adopted for use with the M617 containers due to container design similarities.

PART 2

TEST ATTENDEES

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PART 3

ROAD TEST PROCEDURES

Five separate road testing steps are required as identified herein:

1. Step No. 1 This step provides for the specimen load to be driven over a 200-foot-long segment of concrete paved road which consists of two series of railroad ties projecting 6 inches above the level of the road surface. This hazard course is traversed two times and repeated per Step No. 4.

a. The first series of ties is spaced on 8-foot centers and alternately positioned on opposite sides of the road centerline for a distance of 50 feet.

b. Following the first series of ties, a paved roadway of 75 feet separates the first and second series of railroad ties.

c. The second series of ties is alternately positioned similarly to the first, but spaced on 10-foot centers for a distance of 50 feet.

d. The specimen load is driven across the hazard course at speeds that will produce the most violent vertical and side-to-side rolling reaction obtainable in traversing the hazard course (approximately 5 mph)

2. Step No. 2 This step consists of 30 miles of travel over available rough roads consisting of gravel, concrete and asphalt, curves, cattle gates, and stops and starts.

. Step No. 3 This step provides for the specimen load to be subjected to three full air brake stops while traveling in the forward direction and one in the reverse direction while traveling down a 7 percent grade. The first three stops are speeds of 5, 10, 15 mph while the stop in the reverse direction is of approximately 5 mph.

4. Step No. 4 This step consists of a repeat of that identified in Step No. 1 above.

5. Step No. 5 This step provides for the specimen load to be driven over a 300-foot-long segment of concrete paved road which has rails spaced on 26-1/2-inch centers and protruding 2-inches above the road surface. The specimen load was driven at the speed which will produce the most violent response.

Note: Step Nos. 3 and 5 may be deleted at the discretion of the test conductor.

INSPECTIONS AND DATA COLLECTION

At selected intervals during testing, thorough inspections of the specimen loads were made by technically proficient personnel to collect data on the specimen load and equipment resulting from above load test steps.. This data is recorded in Part 4 following.

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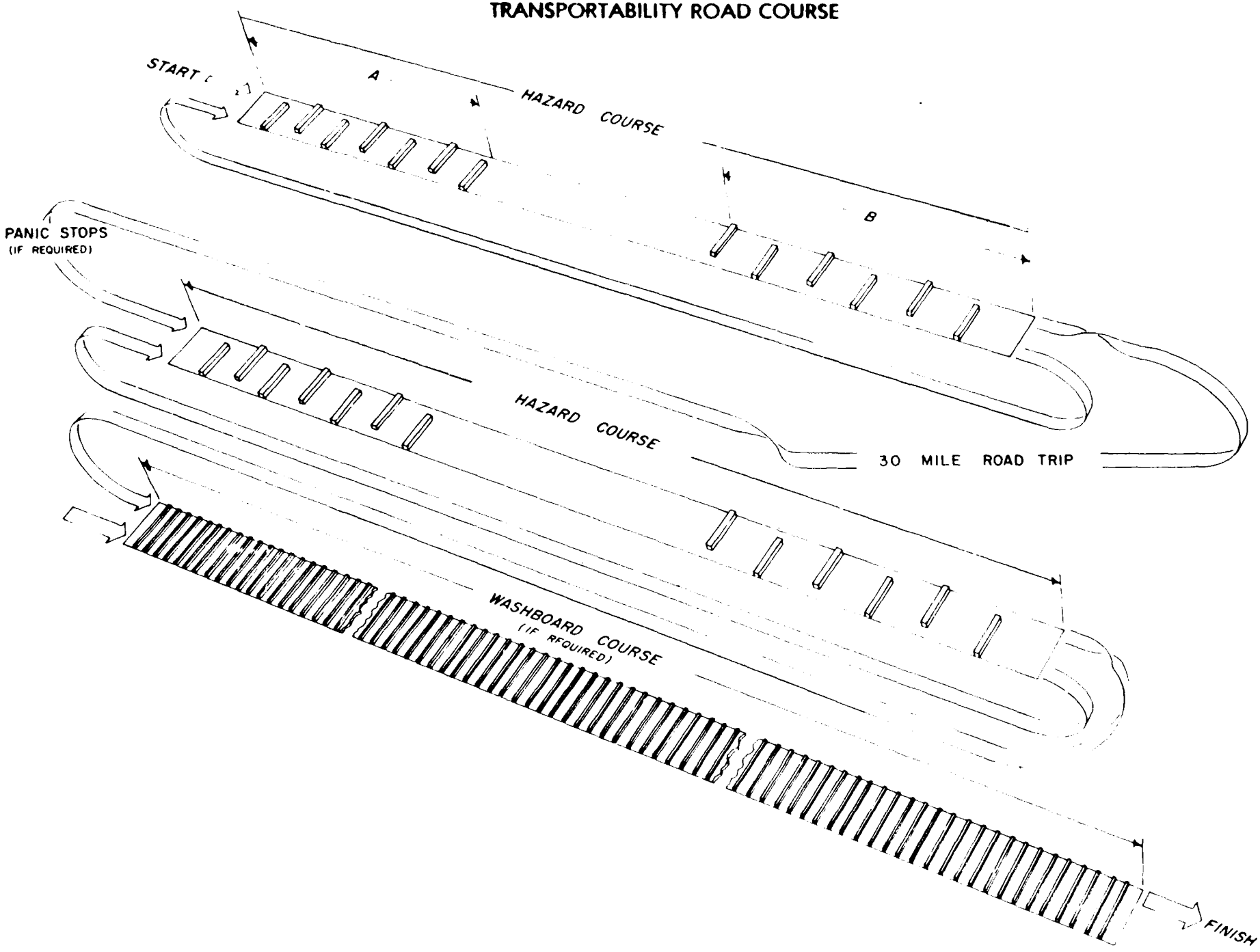
TRANSPORTABILITY ROAD COURSE



PART 4

LOAD SPECIMENS AND RESULTS

SYNOPSIS OF TEST NO. 1

In Test No. 1 a single M467 container was tested positioned longitudinally in the cargo bed of the HMMWV. A total of four web strap tiedown assemblies were required to restrain the single M467 container. Two crossed web strap tiedown assemblies were used on each of the M467 container.

No significant movement was noted during the testing. The tiedown method tested is acceptable for transport on/off highway travel.

ROAD TEST DATA

TEST NO. 1 12 April 1989

TEST SPECIMEN A single M467 container positioned longitudinally and secured in the cargo bed of the HMMWV.

PASS 1-A OVER FIRST SERIES OF TIES	6.90 SEC	4.94 mph
PASS 1-B OVER SECOND SERIES OF TIES	7.05 SEC	4.84 mph

REMARKS Container moved 1/8 inch to the left.

PASS 2-A OVER FIRST SERIES OF TIES	5.85 SEC	5.83 mph
PASS 2-B OVER SECOND SERIES OF TIES	5.55 SEC	6.14 mph

REMARKS No movement.

30 MILE ROAD TEST No movement.

PANIC STOP TEST No movement.

PASS 3-A OVER FIRST SERIES OF TIES	5.25 SEC	6.49 mph
PASS 3-B OVER SECOND SERIES OF TIES	5.55 SEC	6.14 mph

REMARKS No movement.

PASS 4-A OVER FIRST SERIES OF TIES	5.70 SEC	5.98 mph
PASS 4-B OVER SECOND SERIES OF TIES	5.40 SEC	6.31 mph

REMARKS No movement.

WASHBOARD COURSE No movement.

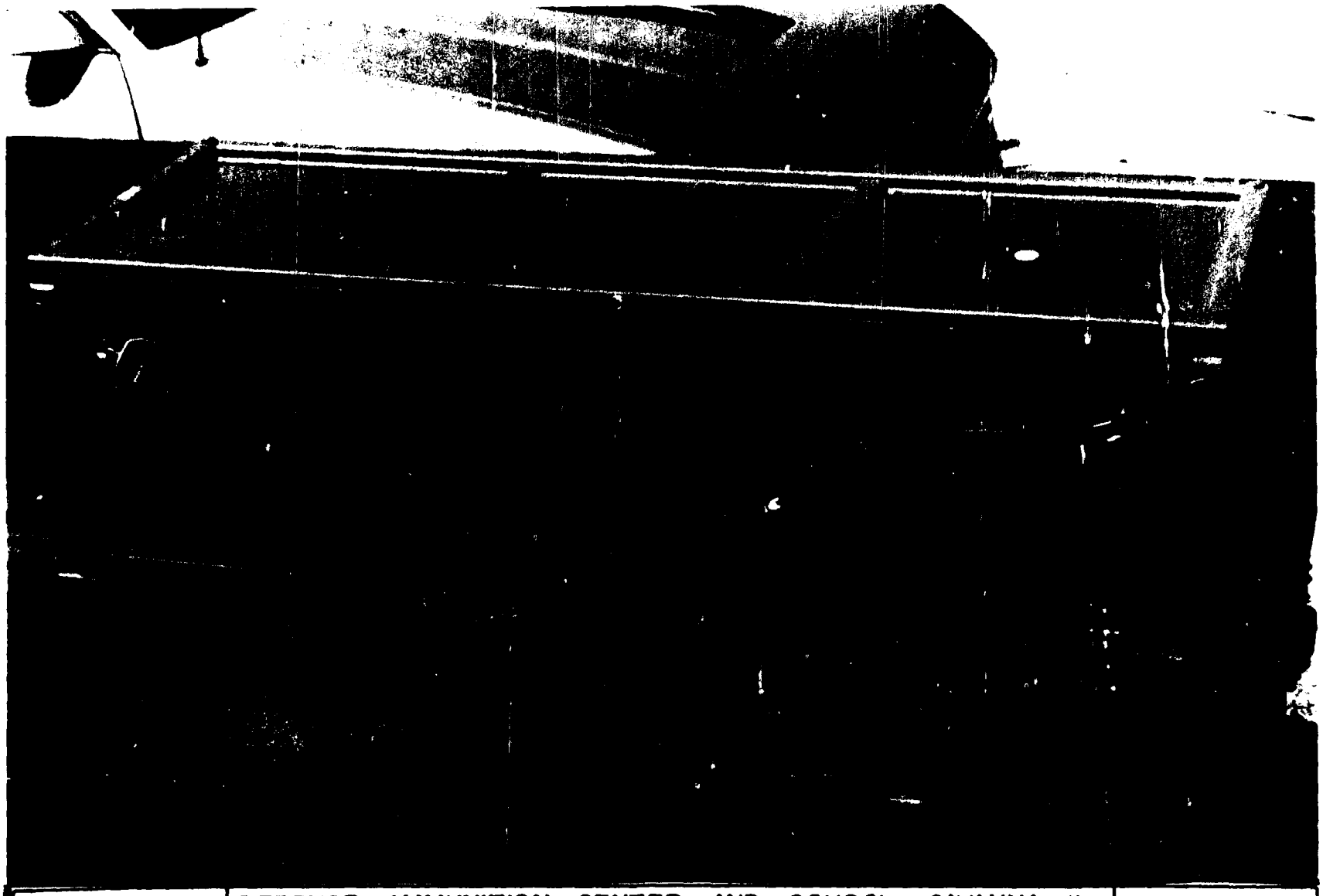


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Photo No. 1 View of a single M467 container secured in the cargo bed of the HMMWV.

SYNOPSIS OF TEST NO. 2

In Test No. 2, two M467 containers were bundled together and tested positioned longitudinally in the cargo bed of the HMMWV. A total of six web strap tiedown assemblies were required to restrain the load of two M467 containers. Two web strap tiedown assemblies were used to bundle the two M467 containers and two crossed web strap tiedown assemblies were used on each side of the bundled containers to secure the containers to the cargo bed.

No significant movement was noted during the testing. The tiedown method tested is acceptable for transport on/off highway travel.

ROAD TEST DATA

TEST NO. 2 12 April 1989

TEST SPECIMEN Two bundle M467 containers positioned longitudinally and secured in the cargo bed of the HMMWV.

PASS 1-A OVER FIRST SERIES OF TIES	5.70 SEC	5.98 mph
PASS 1-B OVER SECOND SERIES OF TIES	5.70 SEC	5.98 mph

REMARKS Containers moved 1/4 inch to the right.

PASS 2-A OVER FIRST SERIES OF TIES	5.70 SEC	5.98 mph
PASS 2-B OVER SECOND SERIES OF TIES	5.85 SEC	5.83 mph

REMARKS Containers moved 1/4 inch to the right.

30 MILE ROAD TEST Omitted

PANIC STOP TEST No movement.

PASS 3-A OVER FIRST SERIES OF TIES	5.85 SEC	5.83 mph
PASS 3-B OVER SECOND SERIES OF TIES	5.85 SEC	5.83 mph

REMARKS No movement.

PASS 4-A OVER FIRST SERIES OF TIES	5.85 SEC	5.83 mph
PASS 4-B OVER SECOND SERIES OF TIES	4.80 SEC	7.10 mph

REMARKS No movement.

WASHBOARD COURSE No movement.

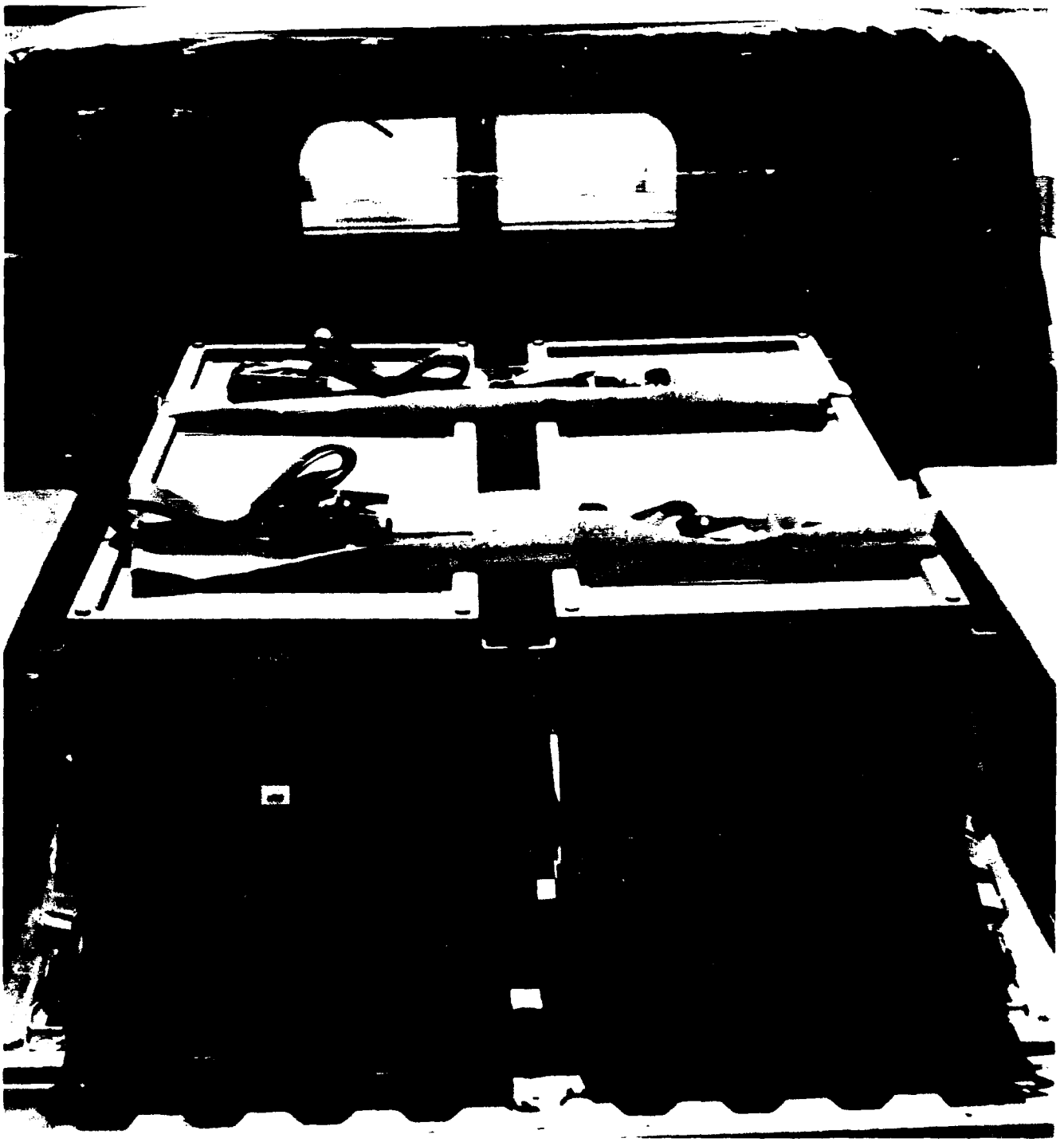

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Photo No. 2 View of two M467 containers bundled together and secured in the HMMWV.

Photo No. 3 View of two M467 containers bundled together and secured in the HMMWV.

SYNOPSIS OF TEST NO. 3

In Test No. 3, two M613 containers were positioned longitudinally in the cargo bed of the HMMWV. Each M613 container was independently restrained with two web strap tiedown assemblies. A total of four web strap tiedown assemblies were required for the two M613 container load.

No significant movement was noted during the testing. The tiedown method tested is acceptable for transport on/off highway travel.

ROAD TEST DATA

TEST NO. 3 13 April 1989

TEST SPECIMEN Two M613 containers positioned longitudinally and secured independently in the cargo bed of the HMMWV.

PASS 1-A OVER FIRST SERIES OF TIES 5.10 SEC 6.68 mph

PASS 1-B OVER SECOND SERIES OF TIES 5.19 SEC 6.68 mph

REMARKS Left container moved right 2 inches of seat well cover.

PASS 2-A OVER FIRST SERIES OF TIES 4.80 SEC 7.10 mph

PASS 2-B OVER SECOND SERIES OF TIES 5.10 SEC 6.68 mph

REMARKS No movement.

30 MILE ROAD TEST Omitted

PANIC STOP TEST 5 mph panic stop - right container moved forward 1/4-inch.

PASS 3-A OVER FIRST SERIES OF TIES 4.80 SEC 7.10 mph

PASS 3-B OVER SECOND SERIES OF TIES 5.10 SEC 6.68 mph

REMARKS Right container moved 1/4 inch to the right.

PASS 4-A OVER FIRST SERIES OF TIES 4.80 SEC 7.10 mph

PASS 4-B OVER SECOND SERIES OF TIES 5.10 SEC 6.68 mph

REMARKS No movement.

WASHBOARD COURSE No movement.

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Photo No. 4 View of two M613 containers secured in the cargo bed of the HMMWV.